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Design Process for Military Projects

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Changes to this document require the concurrence of the Management Representative and approval by the Chief, Military Design Branch, and shall follow the procedures described in *EQP 5-01, Procedure for the Preparation and Administration of Engineering Division Procedures.*

Revision Table

Effective Date	Issue	Revision	Description of Revisions
15 May 2000	1	0	Original release.
1 Apr 2002	2	0	Revised References, Procedures, Records, and links.

CONTENTS

1.0 PURPOSE

This procedure describes how Engineering Division (ED) will ensure that the designs of military projects are fully understood and that all ED design documents are properly developed and documented in a logical and consistent manner.

2.0 SCOPE

This procedure covers all design, studies, and special projects for ED military programs from the point of a contract agreement (see *EQP 3-01, Contract Review*). This procedure provides a guide through the correct steps and procedures for any type of military project, from a "special" effort to a complex, comprehensive project, by following the General Design flow chart at the end of this procedure.

3.0 REFERENCES

The *Headquarters, United States Army Corps of Engineers (HQUSACE) Publications* Internet page is the only repository for all official USACE engineering regulations, circulars, manuals, Army Technical Manuals (Army TM), and other documents originating from HQUSACE.

EP 715-1-7 Architect-Engineer Contracting

ER 5-1-11 Program and Project Management

ER 415-1-10, Contractor Submittal Procedures

ER 415-1-11 Biddability, Constructibility, Operability, and Environmental Review

ER 415-3-11, Post Completion and Design Criteria Feedback Inspection

ER 1110-1-12 Quality Management

ER 1110-2-112, Required Visits to the Construction Sites by Design Personnel

ER 1110-3-113 Department of The Army Facilities Standardization Program

ER 1110-3-1300 Military Programs Cost Engineering

ER 1110-34-1, Transportation Systems Mandatory Center of Expertise

ER 1110-345-100 Design Policy for Military Construction

ER 1180-1-9 Design-Build Contracting

CESPD Regulation 1180-1-9, Design-Build Contracting

TI 800-01 Design Criteria

TI 800-04 Installation Support

TI 801-02 Family Housing

TI 802-01 Code 3 Design with Parametric Estimating

Sacramento District, Engineering and Design Quality Management Plan

A-E Guide, Volume 1 - General Instructions for Army Projects

A-E Guide, Volume 1 - General Instructions for Air Force Projects

A-E Guide, Volume 2 - Cost Estimating

A-E Guide, Volume 3 - Specifications

CESPK-ED-M Design Execution Summary (In-House Design)

CESPK-ED-M Design Completion Summary (In-House Design)

EDM 48, Geotechnical Engineering for Military Projects

MIL-HDBK-1190 Facility Planning & Design Guide (for Air Force)

MIL-HDBK-1008C Fire Protection for Facilities

Uniform Federal Accessibility Standards

ICBO Uniform Building Code

NFPA National Fire Codes

EQP 5-01, Procedure for the Preparation and Administration of Engineering Division Procedures

Depending upon the type of project, the funding source, and the design complexity, various combinations of these regulations, manuals, and guidance will apply and will be required.

4.0 DEFINITIONS

See the *Glossary, QM Appendix 6*, for definitions.

5.0 RESPONSIBILITIES

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All designers and technical staff have a responsibility to review and utilize this procedure in the execution of military construction and Work/Support for Others design work. Should it be decided that any given project would not follow this procedure, approval to deviate must be obtained from the Chief, Military Design Branch.

6.0 PROCEDURES

6.1 Flow Charts

See the following flow-charts beginning on page 11.

Military Projects - General Design

Military Projects – ITR, BCOE and QC Certification

Military Design - Advertise and Award

IFB Process

RFP Process

6.2 General

The design team must develop a Quality Control Plan (QCP) for in-house projects or a Quality Assurance Plan (QAP) for projects designed by Architect-Engineer (A-E) firms. The QCP/QAP are incorporated into the Project Management Plan (PMP), as appropriate, for the size and type of project. The PMP includes the scope, schedule, and budget for the work, team composition, requirements, and the customer's quality expectations.

6.2.1 Quality Control Plan (QCP)

A QCP will be developed by in-house design disciplines only for projects designed in-house. The QCP for small or simple projects (i.e., Estimated Construction Cost <$500,000) should be a very simple, generic document setting forth the schedule and a minimum of coordination information. A more comprehensive document shall be prepared for large or complex projects (i.e., Estimated Construction Cost >$500,000). The QCP should not duplicate items of a definitional or procedural nature that are in the District QMP. The design team leader shall submit the QCP to the PM for review and incorporation into the PMP and through the Chief of Military Design Branch to the Chief of Engineering Division for review/approval prior to initiation of the technical work on the project. It is recognized that each design team has their own quality control procedures and each PM their own management style; however, the product shall meet the customer's expectations for quality, cost and schedule. Proper documentation and QC certification shall be included in the District project files. Once finalized, the QCP/QAP supports the design contract required in *EQP 3-01, Contract Review*. In some cases, such as a small project or a project that must be expedited, a PMP may not be formally developed. If a PMP is not prepared, a QCP/QAP for ED products is still required. Guidance for accomplishing design by A-E contract is contained in the PROSPECT Student Handbook for Architect Engineer Contracting available in the ET&S Section.

6.2.2 Design Execution Summary (DES)

Military Design Branch shall continue to prepare a DES for each I-H military construction (MILCON) project to document the delegation and assignment of responsibility and accountability, define and set performance targets and objectives for the design effort. The Military Design Branch I-H design team shall develop the DES to reflect all activities that are their responsibility. A project specific DES shall be supplemented with the standard I-H technical Quality Control procedures defined in this EQP. The DES shall be negotiated with and accepted by the PM prior to initiating design. Following acceptance by the PM, the DES shall be formally distributed to the design team members, PM, and other appropriate personnel under a cover memorandum signed by the Chief, Military Design Branch. The four (4) elements of the DES are defined in the following subparagraphs. (Note: on very small projects where it is impractical to prepare a full scale DES, a Fee Proposal will instead be prepared and distributed, with a "cc" to Chief, Military Design Branch for information.)

6.2.2.1 I-H Design Team

Paragraph 1 of the DES shall identify by discipline and by name the project design team members. In addition, the design team leader and PM shall also be identified. Military Design Branch is composed of four sections, three of which are comprised of design disciplines. These technical sections constitute the nucleus of a matrix design team process for execution of I-H designs. These technical sections serve as pools from which specific individuals are identified to create specific project design teams. Following completion of a design, the team is disbanded and individuals return to the pool for their next team assignment. The design team is responsible and accountable for executing the specific project design. The design team leader shall be responsible for the coordination, administrative processing, and control of all technical design efforts for a project. The specific technical discipline design effort and details shall be the responsibility of the respective design team members. The design discipline sections are responsible for ensuring appropriate and high quality technical input is provided for each project design effort.

6.2.2.2 Design Budget

Paragraph two of the DES shall identify by discipline and by phase of design the technical design budget for the project. The budget shall be developed from a Task Resource Analysis (TRA) conducted by each discipline based on anticipated sheet counts and man-hour requirements necessary to comply with the project Scope of Services (SOS). The PM shall coordinate the development of the budget, to include all QMP deliverables, and negotiate it with the Resource Manager(s). This technical design budget serves as input to the Total Project Budget.

6.2.2.3 Design Schedule.

Paragraph three of the DES shall identify the project design schedule. The schedule shall identify key interaction and submission milestones within the design process, and reflect the required design phases to be accomplished. Design and review times shall be separately identified. Sequential calendar completion dates shall be identified for each milestone within each phase of design; the calendar day duration between milestones shall also be identified. The calendar dates for the initial design phase shall be accurate upon issuance of the DES. Dates for subsequent phases are projected and subject to modification to reflect the actual start date of each phase. The design team leader shall coordinate the development of the design schedule within the design team and negotiate the schedule with the PM for approval. .

6.2.2.4 Design Assumptions

Paragraph four of the DES shall identify the project technical design requirements and assumptions. This paragraph shall cite as a minimum the applicable Predesign Conference Minutes, project SOS and any special technical or process requirements deemed appropriate by the design team leader for the project.

6.2.2.5 Distribution Memorandum

The DES distribution memorandum shall not be issued until the PM (with appropriate customer input) has approved the project specific DES data. The memorandum is then signed by the Chief, Military Design Branch to serve as notice that the project design team, schedule and budget have been defined and approved for an I-H design effort. The memorandum also serves as a vehicle to delegate authority and responsibility to the I-H design team to execute the design for a project.

6.2.2.6 Cost Tracking[SPF13]

The DES sets the performance targets for an I-H design effort. To guide the process to successful completion, monitoring actual performance against the targets throughout the design effort is necessary. The design team leader

shall be responsible for preparing Cost Tracking reports at an appropriate frequency for distribution to design team members and selected management personnel. These reports shall compare by discipline and by phase of design the DES budget and schedule targets to actual design cost and percent complete data. Each report shall be distributed via a brief cover memorandum prepared by the design team leader that addresses areas of interest and concern. In the future under CEFMS and PROMIS, it is envisioned that the PM, in conjunction with their budget analyst will prepare/distribute cost and schedule tracking information; thus freeing a design team leader to concentrate on technical execution issues.

6.2.2.7 Project Execution Meetings

A management overview of I-H design execution performance and resource use shall be achieved through regularly scheduled Project Execution Meetings. The Chief, Military Design Branch, shall chair these meetings with all section chiefs attending. Each active I-H design effort shall be briefly discussed, addressing such items as: compliance with and requested changes to schedules; cost performance and additional funding requirements; user requested changes and impacts; resource requirements; etc. These meetings are primarily informational in nature; however, they can serve as an action/decision forum when required.

6.2.3 Quality Assurance Plan (QAP)[SPF15]

A QAP will be developed only for designs being accomplished via an A-E contract or task order and will include the Architect-Engineer's (A-E's) QCP. The PM has the responsibility to review, discuss, and obtain Military Design Branch approval of the QAP/QCP for each project being designed by an A-E firm . The PM shall have a system in place to ensure himself/herself that the QAP/QCP is being implemented and followed through each phase of the design process. These activities may include phone calls to the designer to verify scheduled QC functions, design deliverables, and for visits to the designer's office, and/or requesting copies of the designers' QC activity worksheets. Particular attention will be paid to the requirement of the A-E firm to submit a set of final check prints and comments to the PM. The QAP shall address the above activities and verify that the QCP has been carried out.

6.2.4 Lessons Learned

Prior to initiating project-specific design efforts, the District Lessons Learned program will be queried to identify and avoid past problems and issues. At any time during design or construction, Lessons Learned should be generated and furnished to the ET&S Section. Deficiencies in guidance, criteria, specifications, etc., should be reported in the system. See *EQP 14-03, Lessons Learned Program for Military Projects*.

6.2.5 Design Completion Summary (DCS)[SPF17]

Following completion of an I-H design effort, to complete project execution management procedures (i.e., develop a performance "report card"), actual vs. scheduled performance should be compared and evaluated, if adequate funds remain. Additionally, an archival data file containing actual costs and execution time frames for I-H MILCON design efforts would be an invaluable reference tool to enhance the quality and accuracy of future DES schedules and budgets. To accomplish these goals, the design team leader shall compile a project DCS following submission of the final design documents to the PM for construction advertisement. The DCS shall contain a brief description of the project features (by discipline) supported by selected plan sheets (i.e., list of drawings; Site Plan; Floor Plan; Typical Section(s); and Exterior Elevation(s)); a comparison of actual costs to budget, including cost per plan sheet by discipline information; a comparison of projected schedules to actual execution performance; and a summary of unique project issues affecting cost, the schedule, coordination, etc. which would be helpful as an archival reference to understand and interpret the specific project data.

6.3 Design Process

6.3.1 Project Definition/Project Engineering Phase

Army requirements for Project Engineering Documents are found in *TI 802-01, Code 3 Design with Parametric Estimating*. Once reviewed, corrected and submitted, these design documents will represent a 15% design effort.

Air Force requirements for Project Definition products are found in the *A-E Guide, Volume 1 - General Instructions for Air Force Projects*. Once reviewed corrected and submitted, these design documents will represent a 15% design effort.

Instructions for subcontractor design services are contained in the *A-E Guide, Volumes 1-3*. The project specific PMP and QCP/QAP will be followed in performing the functions described herein.

6.3.2 Concept Design Phase

Requirements for 35% design products are found in *Volume 1 of the A-E Guide*. The project specific PMP and QCP/QAP will be followed in performing the functions described herein.

Instructions for PMs managing A-E contracts are found in the A-E Contracting Student Handbook and the A-E Guide.

6.3.3 Preliminary Design Phase

Requirements for 60% design products are found in *Volume 1 of the A-E Guide*. The project specific PMP and QCP/QAP, and will be followed in performing the functions described herein.

Instructions for PMs managing A-E contracts are found in the A-E Contracting Student Handbook and the A-E Guide.

6.3.4 Final Design Phase

Requirements for the final design phase and the 100% corrected final design products are found in *Volume 1 of the A-E Guide*. *ER 415-1-11, Biddability, Constructibility, Operability, and Environmental Review*, shall be followed in obtaining proper certifications from both ED and Construction-Operations Division, preferably prior to advertisement of the project, but, required prior to bid opening or prior to receipt of proposals in the case of procurements via Request for Proposal (RFP). The project specific PMP and QCP/QAP will be followed in performing the functions described herein.

Instructions for PMs managing A-E contracts are found in the A-E Contracting Student Handbook and the A-E Guide.

6.3.5 Advertise and Award Phase

Prior to initiating this phase, the design team leader must be informed by the PM that both "Authority to Advertise" and "Authority to Open Bids" have been received within the District. In rare instances, these authorities are granted "Subject to the Availability of Funds." Otherwise, the Current Working Estimate (CWE) for the base bid should be below the construction funds available. The project specific PMP and QCP/QAP will be followed in performing the functions described herein.

This phase is driven by the PM, but Contracting Division controls the bid opening and award processes.

Instructions for PMs managing A-E contracts are found in the A-E Contracting Student Handbook and the A-E Guides.

6.4 Design-Build

Guidance and criteria for the Design-Build RFP process are identified in *ER 1180-1-9*.

Special requirements and instructions apply to new family housing projects. This information is contained in *TI 801-02, Family Housing*. The project specific PMP and QCP/QAP will be followed in performing the functions described herein.

Instructions for Project Team Leader managing A-E contracts are found in the A-E Contracting Student Handbook and the A-E Guide.

6.5 Special Projects

The requirements for special projects may be contained in various ERs and other written guidance. Applicable requirements need to be discussed during the Contract Review per *EQP 3-01*. The project specific PMP and QCP/QAP will be followed in performing the functions described herein.

[SPF21]Instructions for PMs managing A-E contracts are found in the A-E Contracting Student Handbook and the A-E Guide.

6.6 Construction Activities

Engineering Division's goal is to support the PM, Construction-Operations Division and the construction contractor in the interpretation and execution of the plans and specifications, including, but not limited to, contractor submittal review, design deficiencies, user requested changes, and other construction contract modifications. Guidance is contained in the following documents: *ER 415-1-10*, *ER 415-3-11*; *ER 1110-2-112*; and A-E Guide. The project specific PMP and QCP/QAP will be followed in performing the functions described herein.

Instructions for PMs managing A-E contracts are found in the A-E Contracting Student Handbook and the A-E Guide.

6.7 Product Identification and Traceability

ED's documents are uniquely identifiable and traceable through all stages of the design development process. The identifier must be unique to the project and product. The work instructions for project and product identification are entitled "SOP for Product Identification." Also, work instructions for project and product identification are outlined in EDM 41 titled Official Drawings, Plates, Design Memorandum and Publication Covers, *EQP 16-01, Management of Project Folders for Projects*; and *EQP 16-02, Management of As-Built Drawings*. *EQP 5-02, Control of Project Documents*, provides a process for creating and maintaining project documents.

6.7.1 Process Control

The flow charts at the end of the procedure below illustrate the flow for the acquisition of construction projects via design efforts in ED.

6.7.2 Inspection and Testing

Engineering products must be reviewed and approved at appropriate levels, whether prepared by In-House personnel, consultants, or the customer. The process is outlined in each project specific QCP/QAP, the A-E Guide, and various ERs referenced in this document.

The design team leader will be responsible for outside products received for incorporation into ED products for compliance with accepted criteria.

Nonconformities will be addressed prior to proceeding with use of the product, and a record will be maintained in accordance with *EQP 13-01, Control and Correction of Nonconforming Product.*

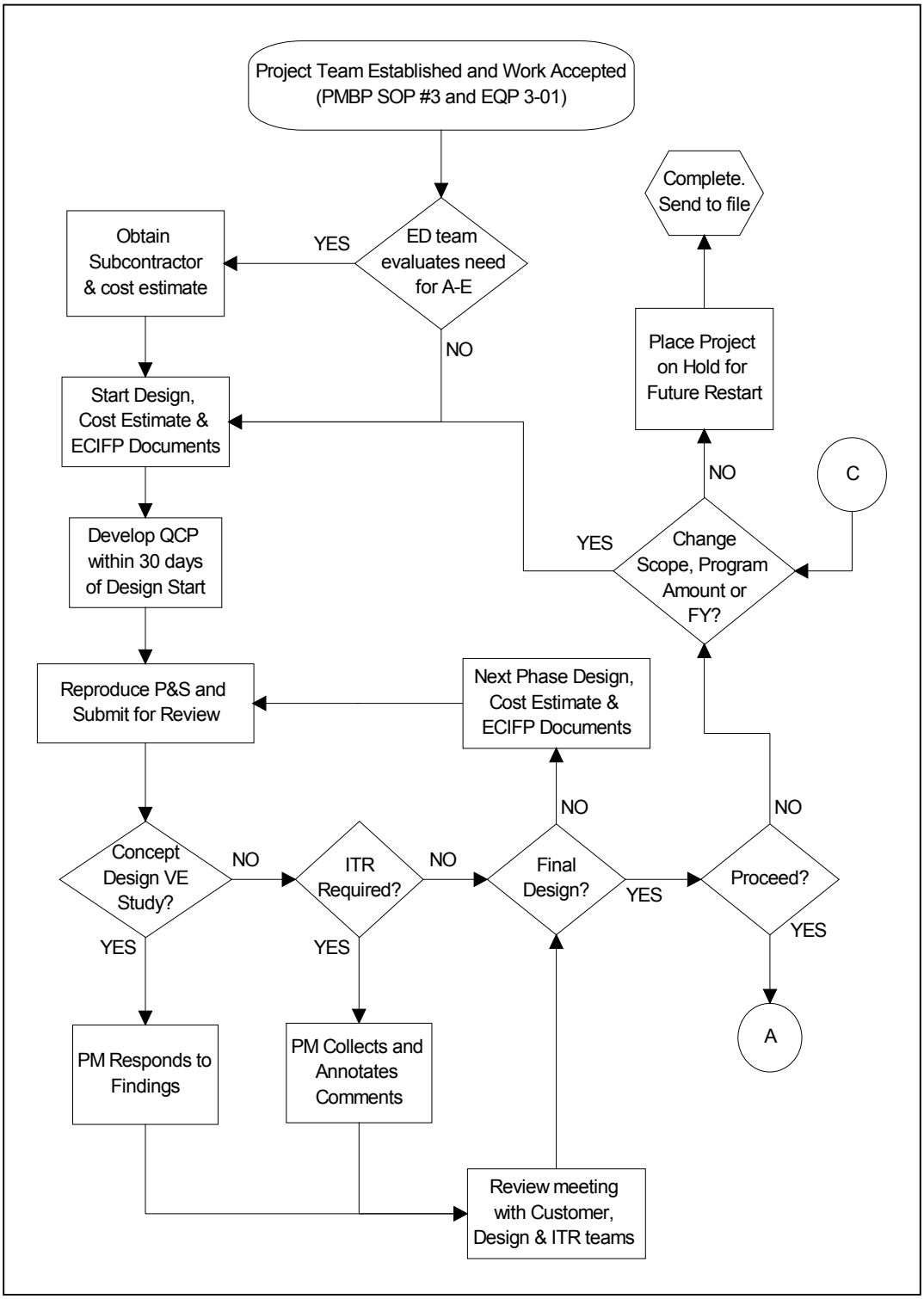
6.7.3 Inspection and Test Status

Status of ED products is reflected in various reports including the Programs and Project Management Information System (PROMIS), and record files. Signatures on a certification document similar to the BCOE Certification indicate approval of plans and specifications, once reviewed and finalized.

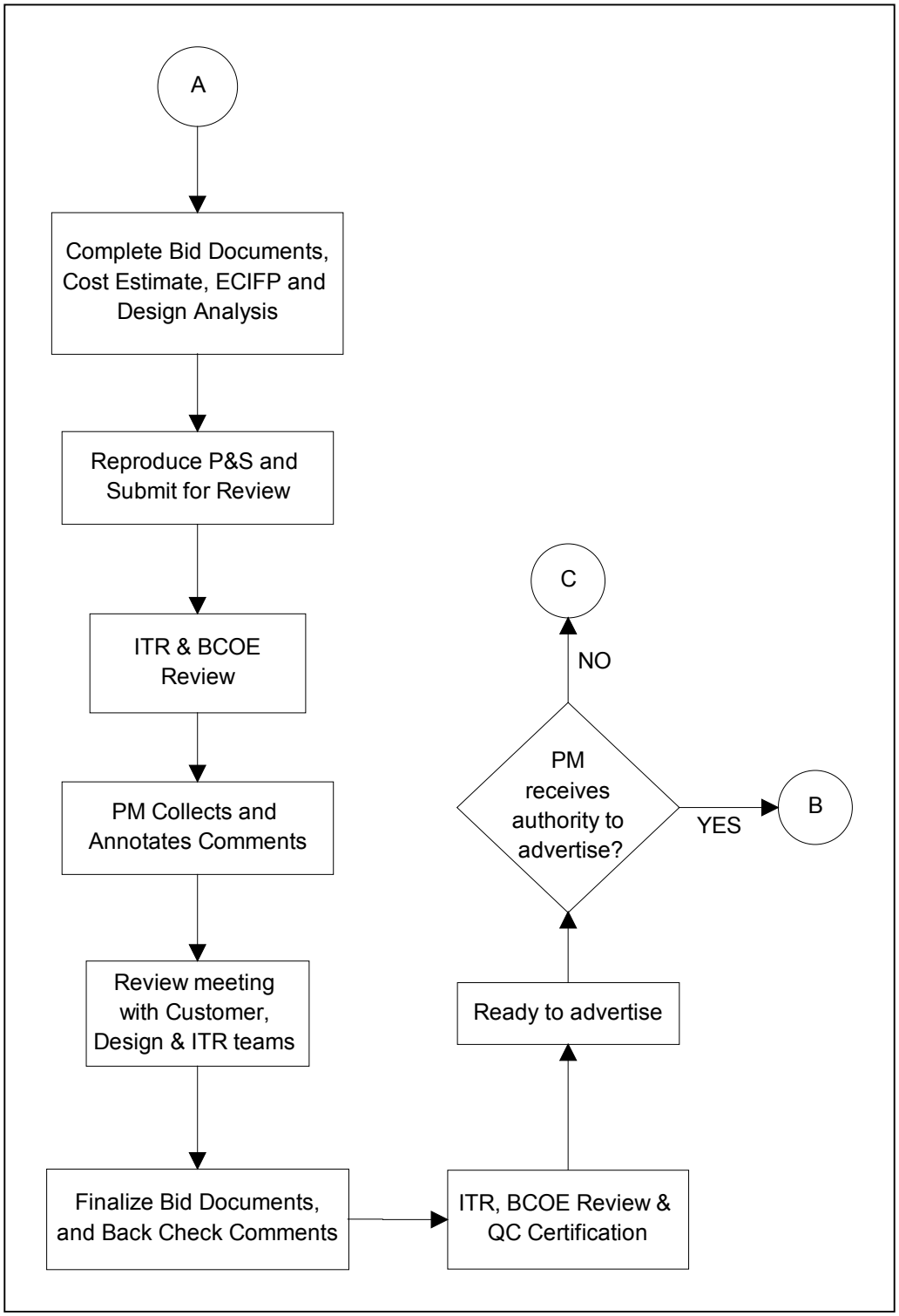
7.0 RECORDS

The PM will be responsible for maintaining official project files for each project in accordance with *EQP 16-01, Management of Project Folders for Projects*. However, this does not mean that individual team members cannot keep unofficial files. The official files will record all actions, processes, and products for each and all phases identified in paragraph 6.0 above. Responsibility will begin upon initial customer contact and continue until project construction close out and project files are sent to Bryte Yard for permanent storage. Formal customer contact for large projects are usually in the form of Army Design Directives or Air Force Design Instructions. Informal initial customer contacts for smaller projects may be a phone call or e-mail followed by a Military Interdepartmental Purchase Request (MIPR). Official A-E contract files are maintained in Contracting Division and are retained until the A-E contract has been closed out at which time they are sent to Bryte Yard. Project files associated with administering design contracts are maintained in ED-M until sent to Bryte Yard for permanent storage. Files are eventually destroyed in accordance with *AR 25-400-2, The Modern Army Record Keeping System (MARKS)*.

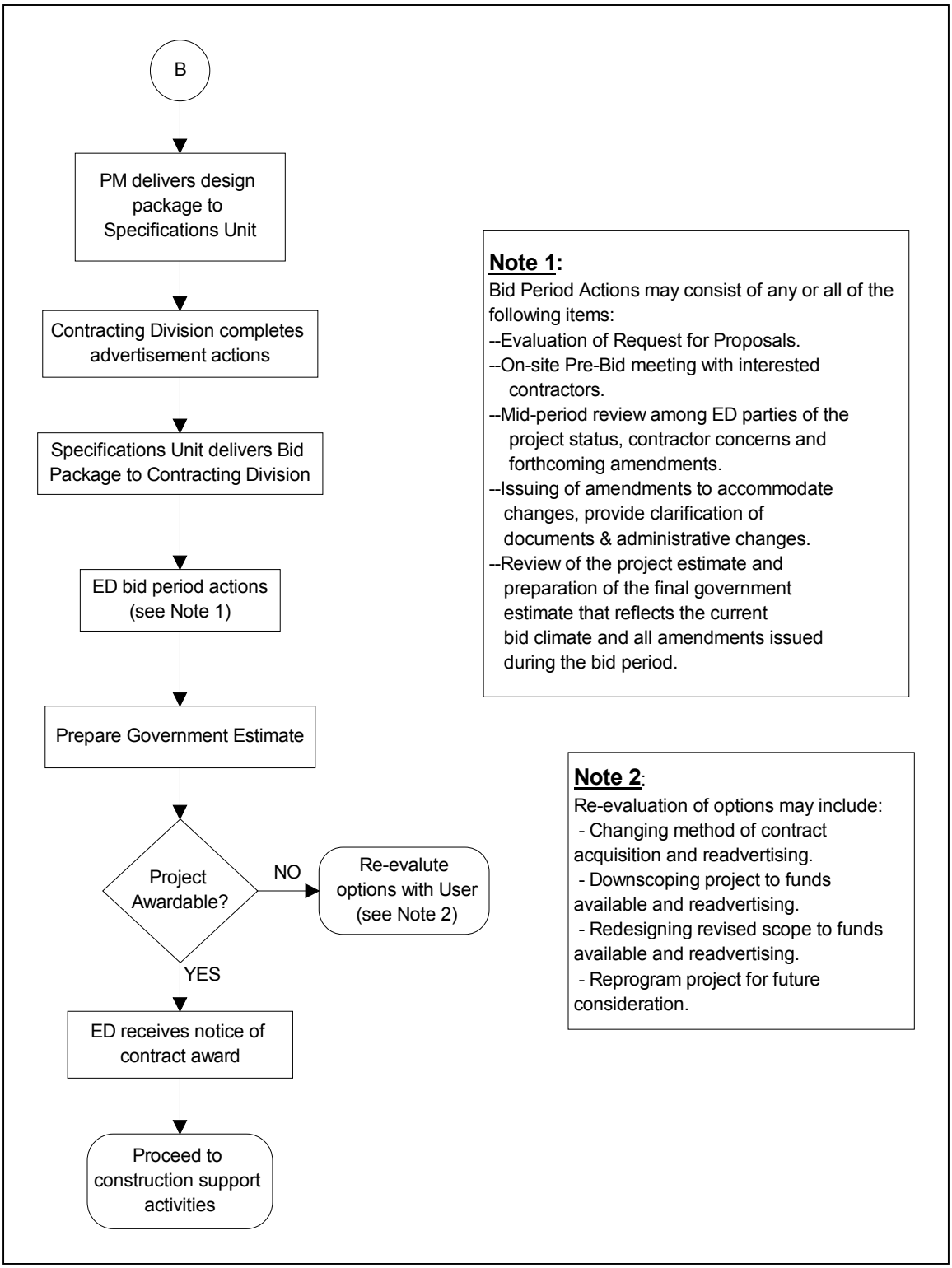
Military Projects - General Design



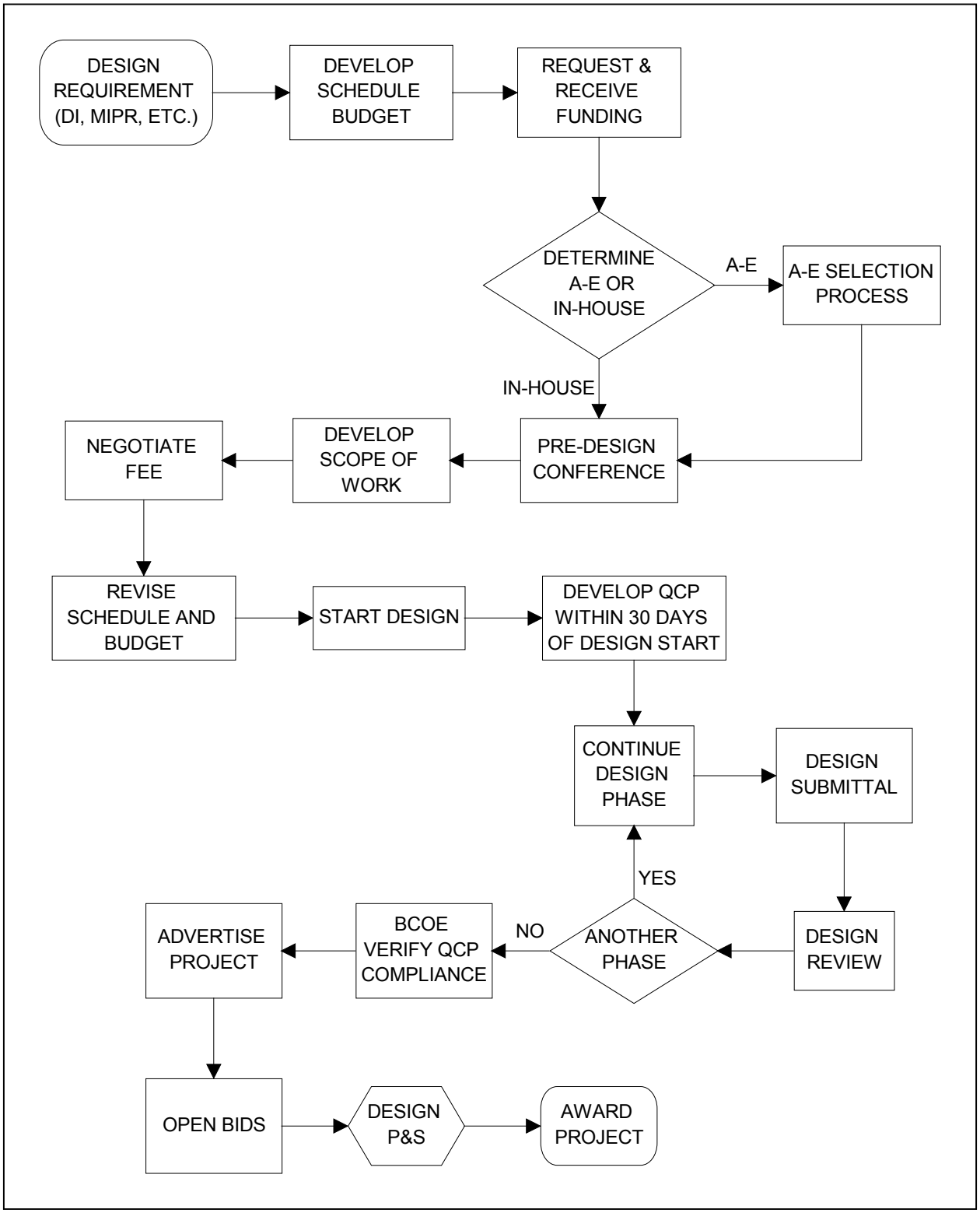
Military Projects – ITR, BCOE and QC Certification



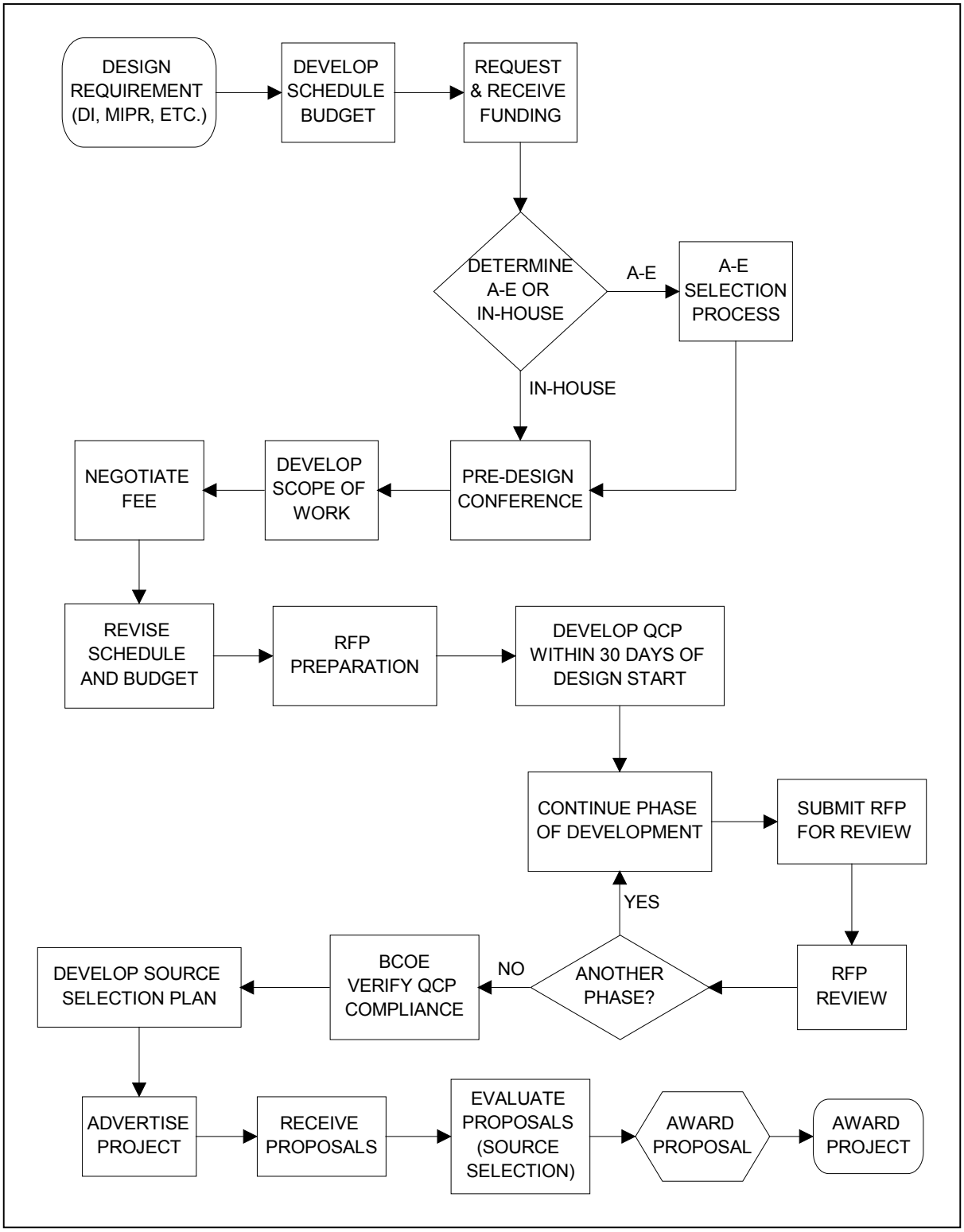
Military Design - Advertise and Award



IFB Process


DESIGN REQUIREMENT (DI, MIPR, ETC.)
DEVELOP SCHEDULE BUDGET
REQUEST & RECEIVE FUNDING
DETERMINE A-E OR IN-HOUSE
A-E
A-E SELECTION PROCESS
IN-HOUSE
PRE-DESIGN CONFERENCE
DEVELOP SCOPE OF WORK
NEGOTIATE FEE
REVISE SCHEDULE AND BUDGET
START DESIGN
DEVELOP QCP WITHIN 30 DAYS OF DESIGN START
CONTINUE DESIGN PHASE
DESIGN SUBMITTAL
YES
DESIGN REVIEW
ANOTHER PHASE
NO
BCOE VERIFY QCP COMPLIANCE
ADVERTISE PROJECT
OPEN BIDS
DESIGN P&S
AWARD PROJECT

RFP Process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DEVELOP SCOPE OF WORK
NEGOTIATE FEE
REVISE SCHEDULE AND BUDGET
RFP PREPARATION
DEVELOP QCP WITHIN 30 DAYS OF DESIGN START
CONTINUE PHASE OF DEVELOPMENT
SUBMIT RFP FOR REVIEW
YES
RFP REVIEW
ANOTHER PHASE?
NO
BCOE VERIFY QCP COMPLIANCE
DEVELOP SOURCE SELECTION PLAN
ADVERTISE PROJECT
RECEIVE PROPOSALS
EVALUATE PROPOSALS (SOURCE SELECTION)
AWARD PROPOSAL
AWARD PROJECT